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ScienceDirect
Psychiatry Research 144 (2006) 65–72
PSYCHIATRY RESEARCH
www.elsevier.com/locate/psychres

Non-suicidal self-injury among adolescents: Diagnostic correlates and relation to suicide attempts

Matthew K. Nock [a,*], Thomas E. Joiner Jr. [b], Kathryn H. Gordon [b], Elizabeth Lloyd-Richardson [c], Mitchell J. Prinstein [d]

[a] *Department of Psychology, Harvard University, 33 Kirkland Street, 1280, Cambridge, MA 02138, USA*
[b] *Department of Psychology, Florida State University, Tallahassee, FL 32306, USA*
[c] *Centers for Behavioral and Preventive Medicine, Brown Medical School, Providence, RI 02903, USA*
[d] *Department of Psychology, University of North Carolina, Chapel Hill, NC 27599, USA*

Received 2 January 2006; received in revised form 9 March 2006; accepted 8 May 2006

Abstract

Non-suicidal self-injury (NSSI) is a prevalent behavioral problem, yet many fundamental aspects of NSSI remain unknown. This case series study reports on the diagnostic correlates of adolescents with a recent history of NSSI and examines the relation between NSSI and suicide attempts. Data are from clinical interviews with 89 adolescents admitted to an adolescent psychiatric inpatient unit who engaged in NSSI in the previous 12 months. Results revealed that 87.6% of adolescents engaging in NSSI met criteria for a DSM-IV Axis I diagnosis ($M=3.0$, S.D. = 2.2, range = 0 to 8 diagnoses), including externalizing (62.9%), internalizing (51.7%), and substance use (59.6%) disorders. Most adolescents assessed also met criteria for an Axis II personality disorder (67.3%). Overall, 70% of adolescents engaging in NSSI reported a lifetime suicide attempt and 55% reported multiple attempts. Characteristics of NSSI associated with making suicide attempts included a longer history of NSSI, use of a greater number of methods, and absence of physical pain during NSSI. These findings demonstrate the diagnostic heterogeneity of adolescents engaging in NSSI, highlight the significant overlap between NSSI and suicide attempts, and provide a point of departure for future research aimed at elucidating the relations between non-suicidal and suicidal self-injury.

Keywords: Self-mutilation; Deliberate self-harm; Self-injurious behavior; Diagnosis; Personality disorder

1. Introduction

Self-injurious behavior (SIB) refers to a broad class of behaviors in which an individual directly and deliberately causes harm to herself or himself. Such behavior can include *non-suicidal self-injury* (NSSI), which refers to direct, deliberate destruction of one's own body tissue in the absence of intent to die; or *suicide attempts*, which refer to direct efforts to intentionally end one's own life. Some authors have noted the theoretical, methodological, and clinical importance of distinguishing among various forms of SIB (O'Carroll et al., 1996; Linehan, 1997); and these suggestions have been supported by empirical studies demonstrating that self-injury-related constructs differ in their correlates (Nock and Kazdin, 2002; Nock and Kessler, in press) and functions (Brown et al., 2002). Although it is clear that NSSI and suicide attempts represent distinct behavioral phenomena, several important questions about

* Corresponding author. Tel.: +1 617 496 4484; fax: +1 617 496 9462.
E-mail address: nock@wjh.harvard.edu (M.K. Nock).

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doi:10.1016/j.psychres.2006.05.010

NSSI and its relationship to suicide attempts are yet to be explained.

First, many fundamental characteristics of NSSI remain unknown. Indeed, the vast majority of prior work on SIB has focused on suicidal ideation and suicide attempts, with only a paucity of research addressing NSSI. For instance, it has been suggested that adolescents engaging in NSSI have higher rates of internalizing disorders (e.g., Ghaziuddin et al., 1992), and also may be at increased risk for a wider range of other cognitive, affective, and behavioral symptoms (e.g., Guertin et al., 2001); however, information about the diagnostic correlates of NSSI is lacking. Such information would be very useful for determining how NSSI corresponds with disorder currently listed in the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV; American Psychiatric Association, 1994), especially given recent suggestions that NSSI should be considered for inclusion as a new DSM-IV diagnosis (Pattison and Kahan, 1983; Muehlenkamp, 2005).

Even less research attention has been given to the presence of personality disorders among adolescents who engage in NSSI. Although there is debate about the validity or appropriateness of diagnosing personality disorders before adulthood, the current edition of the DSM indicates they may be diagnosed when "maladaptive personality traits appear to be pervasive, persistent, and unlikely to be limited to a particular developmental stage or an episode of an Axis I disorder" (American Psychiatric Association, 1994, p. 631). Moreover, prior work has shown that the prevalence and the structure of personality disorders among adolescents resemble those in adulthood, and that the presence of a personality disorder during adolescence significantly increases the risk of subsequent disorders, providing validity for the application of such diagnoses (Bernstein et al., 1993; Westen et al., 2003). Although NSSI is most often associated with borderline personality disorder (BPD; Dulit et al., 1994; Shearer, 1994), the rate of BPD among adolescents engaging in NSSI is not known, nor is the rate of other personality disorders in this population. Overall, a systematic examination of Axis I and Axis II diagnoses among adolescents with a recent history of NSSI would be informative to both scientists and clinicians working with adolescent self-injurers.

Second, although NSSI and suicide attempts are distinct behavioral phenomena, they often co-occur within individuals (Dulit et al., 1994; Brown et al., 2002), yet it is unclear why this is so. Gaining a better understanding of what percentage of those engaging in NSSI also make suicide attempts, as well as why these behaviors are related, is a necessary step in helping clinicians identify and intervene with individuals at risk for multiple forms of SIB. The identification of aspects of NSSI that are associated with suicide attempts would be particularly useful given the dangerousness and lethality of these behaviors.

Why would individuals who engage in NSSI be at elevated risk for suicide attempts? Joiner (2005) recently advanced a comprehensive theory of SIB that makes several specific hypotheses about why individuals with a history of NSSI might engage in suicide attempts. He proposed that because suicide is such a frightening and extreme action, most people initially lack the ability to engage in suicide attempts. Individuals may become more courageous, competent, and willing to make suicide attempts with repeated engagement in NSSI and may even experience increasing reinforcement in the process (e.g., many patients report that self-injury has calming effects; see Haines et al., 1995). In other words, a negative side effect of engaging in NSSI may be that individuals habituate to the fear and physical pain associated with self-injury, thus acquiring the capability to perform lethal self-injury. As a test of this theory, we would hypothesize that those with a longer and more extensive history of NSSI (i.e., greater frequency, longer duration, and use of more methods of NSSI) should make suicide attempts more often than those without such a history.

The fundamental propositions of this model also draw upon previous research on pain analgesia among those engaging in SIB. Prior studies have demonstrated that some individuals report experiencing minimal or no pain during repetitive NSSI, despite clear and sometimes severe tissue damage (e.g., Nock and Prinstein, 2005). Differences in the experience of pain also are evident in behavioral laboratory tasks measuring pain threshold and tolerance. For instance, women diagnosed with borderline personality disorder (BPD) who report analgesia during NSSI have a higher pain threshold and pain tolerance on laboratory tasks (e.g., the cold pressor task) than women with BPD who report pain during NSSI (Russ et al., 1992), those who have no history of NSSI (Kemperman et al., 1997), depressed psychiatric inpatients (Russ et al., 1999), and healthy controls (Bohus et al., 2000). Similarly, several studies have demonstrated pain analgesia among recent suicide attempters. Orbach et al. (1997) found that adolescent suicide attempters (excluding those who had engaged in NSSI) have higher thermal pain thresholds and greater pain tolerance than non-suicidal adolescent inpatients and healthy control subjects. In addition, Orbach et al. (1996) reported that individuals visiting an emergency room following a suicide attempt endured more electric shocks and reported less physical pain than healthy control subjects or those admitted for accidental injuries. Taken together, these findings provide converging evidence for

increased pain threshold and tolerance in those engaging in NSSI and suicide attempts. As a further test of the model described above, we would hypothesize that adolescents reporting less physical pain during NSSI would have less of an aversion to engaging in SIB and thus would have a history of engaging in more frequent NSSI, would report using a greater number of NSSI methods, and would make suicide attempts more often than those who experience physical pain during NSSI.

The primary goals of the current study were to (1) examine the diagnostic characteristics of adolescents with a recent history of NSSI, and (2) provide an initial, cross-sectional examination of the hypothesized relations between NSSI, suicide attempts, and physical pain in a sample of adolescent inpatients with a recent history of NSSI. Notably, the current study is cross-sectional and therefore is not able to test the temporal relations between NSSI, suicide attempts, and the experience of physical pain. Instead, this study represents an initial, exploratory evaluation of the relations hypothesized above that can, if supported, be evaluated using a prospective design.

2. Methods

2.1. Participants

Participants in the current study were 89 (23 males, 66 females) adolescents (12–17 years; $M=14.7$, S.D.$=1.4$) selected from consecutive admissions to an inpatient psychiatric unit who reported engaging in NSSI in the previous 12 months. Participants self-identified as 76.4% European American, 8.9% Latin American, 4.5% African American, and 10.1% Mixed Ethnicity/Other adolescents. According to state census tract data, socioeconomic status for adolescents in this sample was: 3.0% High, 57.6% Moderate, 24.2% Low, and 15.2% Poverty. These data are from a larger study of adolescent psychopathology that produced two prior studies of adolescent self-injury (Nock and Prinstein, 2004, 2005); however, the hypotheses and data evaluated in this study differ significantly from these previous reports and so are reported separately.

2.2. Measures

2.2.1. Psychiatric diagnosis

Participants' psychiatric diagnoses on Axis I were evaluated using the *Diagnostic Interview Schedule for Children* (DISC), a structured clinical interview developed for use with children and adolescents ages 6 to 17 years (Shaffer et al., 1996). The DISC contains items that assess current and past symptoms, behaviors, and emotions corresponding to criteria from the *Diagnostic and Statistical Manual of Mental Disorders*, 4th edition (American Psychiatric Association [APA], 1994). The DISC has demonstrated adequate diagnostic sensitivity (Fisher et al., 1993), test–retest reliability (Jensen et al., 1996), and criterion validity (Schwab-Stone et al., 1996). All interviewers in the current study received extensive training in the administration and scoring of the DISC as well as supervision throughout the course of the study.

Participants' psychiatric diagnoses on Axis II were evaluated using the *Diagnostic Interview for DSM-IV Personality Disorders* (Zanarini et al., 1996; DIPD-IV), a semi-structured clinical interview that assesses the 10 DSM-IV personality disorders. The DIPD-IV is a widely used measure with adequate test–retest and inter-rater reliability (Zanarini et al., 2000). In the current study, data for the DIPD are available for females only because the larger study from which these data are drawn included hypotheses about personality disorders specific to females. Nevertheless, these data are reported in the current study to provide initial information about the rate of personality disorders among adolescents with a history of NSSI.

2.2.2. Suicide attempts

Adolescents' lifetime history of suicide attempts was assessed using the DISC questions inquiring about such occurrences. The use of suicide items from structured diagnostic interviews is a common approach to the assessment of suicide-related constructs among children and adolescents that has been successfully employed in previous studies (Prinstein et al., 2001; Nock and Kazdin, 2002).

2.2.3. Non-suicidal self-injury

Participants' performance of NSSI over the previous 12 months was evaluated using the *Functional Assessment of Self-Mutilation* (FASM) (Lloyd et al., 1997). The FASM is a semi-structured clinical interview that evaluates the behavioral functions and the frequency of different methods of NSSI used by the adolescent as well as other characteristics of this behavior, such as the average degree of self-reported physical pain experienced during NSSI episodes (1 = "no pain," 2 = "little pain," 3 = "moderate pain," and 4 = "severe pain") and the age of onset of this behavior. Previous research has described the factor structure and has supported the reliability and validity of the FASM within the current sample (Nock and Prinstein, 2004, 2005).

2.3. Procedures

Following admission to an adolescent psychiatric inpatient unit and interview by the clinical staff, all adolescents

participated in a comprehensive psychiatric interview in which they completed the DISC, the DIPD, and the FASM. All assessment procedures were conducted by trained and supervised clinical research assistants, and the participants were informed that the information provided would be shared with the clinical staff for the purposes of clinical assessment and treatment. All adolescents with a diagnosis of a psychotic disorder were triaged to a separate unit and were not included in this study. For participants admitted to the unit on more than one occasion during the study period, only data from the first admission were used. All study procedures were approved by the hospital's institutional review board.

2.4. Data analysis

Descriptive statistics are reported for the primary study variables. In addition, relations between continuous variables were evaluated using bivariate correlations, and between continuous and categorical variables using *t* tests for independent samples and one-way analyses of variance (ANOVAs).

3. Results

3.1. Diagnostic correlates of NSSI

Axis I diagnoses for the current sample of adolescent inpatients with a recent history of NSSI are reported in Table 1. Overall, 87.6% met criteria for at least one DSM-IV diagnosis (M=3.0; S.D.=2.2; range=0 to 8 diagnoses). Although slightly more than half of the adolescents met criteria for an internalizing disorder (51.7%), most also met criteria for an externalizing disorder (62.9%) and a substance use disorder (59.6%). Examination of the specific substances used reveals that the majority of this comorbidity is accounted for by nicotine dependence; however, a sizable minority also reports marijuana and alcohol abuse and dependence (see Table 1). There were no gender differences for any diagnoses with the exception of major depressive disorder (males=21.7%, females=49.2%, χ^2=5.3, df=1, P<0.05) and conduct disorder (males=73.9%, females=41.5%, χ^2=7.1, df=1, P<0.01). Axis II diagnoses for females in the current sample are reported in Table 2. Overall, 67.3% met criteria for a DSM-IV personality disorder. Borderline personality disorder was most common, with avoidant and paranoid personality disorders diagnosed at relatively high rates as well.

Table 1
Axis I diagnoses of adolescents engaging in NSSI

Variable	%
Axis I diagnosis on DISC	
Any internalizing	51.7
Major depressive disorder	41.6
Post-traumatic stress disorder	23.6
Generalized anxiety disorder	15.7
Any externalizing disorder	62.9
Conduct disorder	49.4
Oppositional defiant disorder	44.9
Any substance use disorder	59.6
Alcohol abuse	18.0
Alcohol dependence	16.8
Nicotine dependence	38.6
Marijuana abuse	12.6
Marijuana dependence	29.5
Other substance abuse	3.4
Other substance dependence	5.6

Note: DISC = Diagnostic Interview Schedule for Children.

Table 2
Axis II diagnoses of adolescent females engaging in NSSI

Variable	%
Diagnosis on DIPD	
Borderline PD	51.7
Avoidant PD	31.0
Paranoid PD	20.7
Dependent PD	6.9
Histrionic PD	6.9
Narcisstic PD	5.2
Obsessive PD	3.4
Schizoid PD	1.7
Schizotypal PD	1.7
Antisocial PD	0.0

Note: DIPD = Diagnostic Interview for Personality Disorders; PD = personality disorder.

3.2. Relations between NSSI and suicide attempts

Overall, 70% of adolescents engaging in recent NSSI reported a lifetime history of at least one suicide attempt. Fifteen percent of the total sample reported making only one suicide attempt during their lifetime, while 55% reported two or more lifetime suicide attempts. For the entire sample, the average number of lifetime suicide attempts was 2.8 (S.D.=4.0, range=0–20). Females (M=3.2, S.D.=4.1) reported more lifetime suicide attempts than males (M=1.8, S.D.=3.6); however, this difference was not statistically significant (t=1.44, df=87, P=0.15, d=0.31). In fact, there was a notable lack of gender differences on each characteristic of NSSI examined. Males and females did not differ in number of episodes of NSSI (M=101.4, S.D.=188.8 vs. M=72.8, S.D.=106.9), duration of NSSI history (in years: M=1.6, S.D.=1.8 vs. M=1.9, S.D.=1.9), number of different NSSI methods used (M=3.7, S.D.=2.1 vs. M=4.0, S.D.=2.7), or degree of physical pain experienced (M=2.0, S.D.=1.1 vs. M=1.8,

Table 3
Relations between pain and self-injurious behaviors

	No pain	Little pain	Moderate pain	Severe pain	Test statistic
	(n=42)	(n=29)	(n=11)	(n=7)	F (3, 85)
Total NSSI episodes	55.7 (97.3)[a]	69.1 (111.8)[a]	115.1 (151.2)[ab]	218.1 (257.8)[b]	3.64*
Total NSSI methods	3.0 (2.0)[a]	4.3 (2.6)[b]	4.3 (2.9)[abc]	6.9 (2.6)[c]	6.06**
Lifetime suicide attempts	3.8 (5.3)	2.2 (2.2)	1.4 (1.4)	2.2 (1.4)	1.66

Note: [abc]Row values with different superscripts are significantly different from each other. *P<0.05, **P<0.01.

S.D.=0.9), all ts<1. In addition, adolescent age also was not significantly related to frequency of NSSI, number of methods used, experience of physical pain, or presence or number of suicide attempts.

Our first set of hypotheses regarding the relation between NSSI and suicide attempts was that a greater frequency of NSSI, the use of more methods, and a longer duration of NSSI would all be associated with a greater frequency of suicide attempts. Contrary to expectations, the overall number of adolescents' NSSI episodes was not associated with the number of lifetime suicide attempts, r=0.03, *ns*. However, consistent with our predictions, the number of lifetime suicide attempts was associated with both the number of different NSSI methods used, r=0.23, P<0.05, and the number of years for which adolescents had been engaging in NSSI, r=0.30, P<0.05.

3.3. Relations between NSSI, suicide attempts, and pain

Our second set of hypotheses regarding the relation between pain and self-injury was that adolescents reporting less physical pain during NSSI would have a history of more frequent NSSI, would report using a greater number of NSSI methods, and would report more suicide attempts. We tested these three hypotheses using analyses of variance (ANOVAs) with the amount of pain experienced during NSSI entered as the independent variable and each self-injury construct entered as dependent variables (Table 3). Contrary to our hypotheses, the adolescents' report of less physical pain was associated with a significantly *lower* number of NSSI episodes and use of *fewer* NSSI methods. However, those who reported less physical pain during NSSI reported engaging in more suicide attempts. Although the omnibus ANOVA for this test was not statistically significant (perhaps due to the limited statistical power to detect this effect, power=0.29), a difference is apparent between those who reported "no pain" relative to those in the three other pain groups in the number of lifetime suicide attempts. An exploratory, post hoc comparison of the "no pain" group with all other groups combined, which provided greater statistical power (power= 0.53) to test this hypothesis, revealed a significant difference such that those who experienced no pain during NSSI reported making almost twice as many suicide attempts (M=3.8, S.D.=5.3) as those who reported an experience of physical pain (M=2.0, S.D.=1.9), t=2.07, df=87, P<0.05, d=0.44.

4. Discussion

This study examined the diagnostic correlates of NSSI and evaluated the relations between NSSI, suicide attempts, and the experience of physical pain among adolescent psychiatric inpatients. Several important findings warrant brief comment. These findings suggest that adolescents with a recent history of NSSI are a diagnostically diverse group, with more than half meeting DSM-IV criteria for an internalizing disorder, an externalizing disorder, and a substance-related disorder. Although it may be common to think of NSSI as being associated with affective or psychotic disorders, the composition of this sample suggests such behaviors occur in individuals who meet diagnostic criteria for a wide range of other disorders. This is the first study of which we are aware to use structured clinical interviews to systematically examine the diagnostic correlates of adolescents with a recent history of NSSI. It is interesting that the rate of diagnosable mental disorders among those engaging in NSSI (87.6%) in this study approximates the rate of mental disorders among those engaging in suicidal self-injury, which is 90–95% in most studies (e.g., Moscicki, 1999; Cavanagh et al., 2003). This finding extends prior work on this topic and suggests mental disorders are overwhelmingly present among those engaging in all forms of self-injury. It will be important for future research to examine the consistency of the rates obtained here with those observed in additional inpatient, outpatient, and community samples of adolescents.

These data revealed that approximately two thirds of female adolescent inpatients with a recent history of NSSI meet DSM-IV criteria for a personality disorder. About half meet the criteria for borderline personality disorder, one third for avoidant personality disorder, and one fifth for paranoid personality disorder. The association between NSSI and borderline personality disorder is not surprising given prior work linking these two constructs (Dulit et al.,

1994; Shearer, 1994). Notably, engaging in SIB of some kind is among the criteria of BPD; therefore, the extent of the overlap between BPD and NSSI may be slightly overestimated in this and other studies. Because the item regarding NSSI in the DIPD-IV also inquires about suicide threats, gestures, and attempts, we were unable to examine the rate of BPD in this sample with NSSI parceled out. It will be important to do so in future studies, and it is expected that the adjusted estimate of BPD among those engaging in NSSI will be slightly lower.

The prominence of avoidant and paranoid personality disorder among this sample was less expected. Prior work has suggested that adolescents engage in NSSI in an attempt to regulate their affect as well as their relationships with others (Guertin et al., 2001; Brown et al., 2002; Nock and Prinstein, 2004, 2005), and this may partially explain why such adolescent self-injurers were most likely to meet criteria for personality disorders related to problems in these areas. An important direction for future research on the diagnosis of personality disorders among adolescents will be to follow diagnosed individuals over time to examine the value and predictive validity of such diagnoses during this developmental period.

It is notable that there were no significant gender differences in the frequency, duration, or number of methods of NSSI or in the amount of physical pain experienced during NSSI in this sample. Studies of NSSI in community samples have also failed to find significant differences between males and females on the rate of NSSI (Briere and Gil, 1998; Zoroglu et al., 2003; Hilt et al., submitted for publication). Thus, although previous research has demonstrated clear gender differences for suicidal ideation, attempts, and deaths, such differences are less apparent in NSSI.

Although the two forms of SIB examined here are quite distinct, there was a surprisingly high rate of suicide attempts in this sample of adolescents engaging in recent NSSI. This finding underscores the importance of gaining a better understanding of how and why some self-injurers develop an intention to die while others do not. In support of Joiner's (2005) theory that the probability of suicide attempts is increased when individuals habituate to the fear and physical pain associated with self-injury, thus acquiring the capability to perform lethal self-injury, we found that a longer history of NSSI, the use of more methods of NSSI, and the absence of physical pain during NSSI were all associated with a higher rate of lifetime suicide attempts. However, support for this theory was tempered by the findings that the frequency of NSSI was not associated with the number of lifetime suicide attempts, and by the unexpected positive relation between the experience of physical pain and the frequency and number of methods of NSSI — a finding that is at odds with the habituation hypothesis. An alternative hypothesis consistent with the current findings is that instead of habituating to pain, some individuals simply fail to experience pain even during initial episodes of NSSI. We were unable to evaluate the temporal patterns of pain experience or relations between each of the primary variables given the cross-sectional nature of our data. Thus, this alternative hypothesis requires prospective study and represents another intriguing direction for future work.

Several limitations of this study should be noted. First, our sample consisted of adolescents admitted to a psychiatric unit who were mostly female and mostly of European American descent, and thus may not generalize to other samples. For instance, the rates of psychopathology and suicide attempts observed here may be higher than would be found among a community sample. Nevertheless, these data provide useful information for those working in more acute psychiatric settings and an important point of departure for work on this topic more generally. Second, our data relied on retrospective adolescent-report of self-injury and the experience of physical pain, precluding any firm conclusions about the temporal relations among the constructs examined. Third, we used average pain ratings and aggregated all NSSI data (e.g., overall frequency of NSSI, number of methods). It would be instructive to use a prospective design and a finer level of analysis to examine relations among the variables of interest in future studies. For instance, subsequent work in this area would benefit from using severity ratings for worst-point NSSI episode as an important variable to evaluate along with frequency ratings (see Joiner et al., 2003) when examining hypotheses involving the prediction of self-injurious behaviors. Fourth, this study examined a limited range of constructs potentially involved in the development and maintenance of self-injurious behaviors. It is likely that NSSI, suicide attempts, and the experience of pain are all affected in meaningful ways by other constructs not examined, such as the level of psychological pain/distress or hopelessness at the time of the episode. Fifth and finally, because this report is based on data drawn from an existing study, some study constructs were not measured as precisely and comprehensively as will be possible in future studies (e.g., Axis II assessment for females only). These limitations notwithstanding, this study provides valuable information about the relations among these important constructs and establishes a useful starting point for future research on the performance of self-injurious behaviors.

These findings have fairly direct implications for clinical practice. NSSI and suicide attempts occur at a relatively high rate among children and adolescents; thus, there is a strong need for clinicians to be acquainted with

the demographic and diagnostic correlates of these behaviors, as well as with the relations among these different forms of self-injury. The current report provides new information in each of these domains. The high rate of suicide attempts in this sample of adolescents engaging in NSSI, and multiple attempts in particular, should prompt clinicians to evaluate the presence of suicidal thoughts and behaviors in those engaging in NSSI and vice versa. It is clear that these are distinct behaviors; however, it is equally clear that these behaviors often co-occur. These findings also should prompt clinicians to evaluate the presence of SIB not only among those with internalizing disorders, but also among those presenting with externalizing behavior problems and substance use disorders as well. In addition, the relation between suicide attempts and duration of NSSI, number of methods of NSSI, and analgesia may be of clinical interest. Although the temporality of these relations is currently unknown, given the seriousness of suicidal behaviors, clinicians may consider evaluating the presence of these correlates among self-injurers until future research provides more specific information about the occurrence and determinants of these complex and dangerous behaviors.

Acknowledgments

Support for this work was provided in part by a grant from NIMH (MH11770) to MJP. The authors would like to thank Dana Damiani and Joy Richmond for their assistance with data collection and Elizabeth Holmberg for her assistance in preparing the manuscript.

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